

Quantification of Delayed Activation in Right Ventricular Outflow Tract in Brugada Patients

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Introduction: Brugada syndrome (BrS) is an inherited disorder associated with an increased risk of sudden cardiac death. Abnormal conduction in the right ventricular outflow tract (RVOT) of BrS patients has been revealed, being a substrate of ventricular fibrillation. This work aims to estimate ventricular activation time sequence for quantification of delayed conduction in RVOT from 24-h Holter monitoring. **Methods:** Electrocardiograms from BrS patients (N=43, age 54[46;61] year, sex 76% male, symptomatic 35%, BrS type-1 56%) and controls (N=15, age 26[24;56] year, sex 60% male) were recorded with a 12-lead ECG recorder with high placement of precordial leads. Ventricular activation times for each lead were established as the time corresponding to 50% of the total energy of the median QRS complex (see Figure). The spatial dispersion of ventricular activation was estimated as the maximum difference in activation time across all leads every 30 minutes. The 24-h variability in ventricular activation was estimated as the standard deviation of ventricular activation time along 24 h in each lead (see Table). **Results:** BrS patients exhibit a larger spatial dispersion of ventricular activation when compared to controls (BrS 12[5;27] ms and controls 4[3;8] ms, $p < 0.01$). In the majority of controls, V2_{4IC} is the first lead and V1_{2IC} is the last lead to activate. Whereas in the majority of BrS patients, V1_{4IC} or V2_{4IC} are the first leads and V1_{2IC} or V2_{2IC} are the last leads to activate. Further, the BrS patients exhibit a larger 24-h variability in ventricular activation when compared to controls (see Table), indicating a larger temporal variation in the activation sequence compared to controls. **Conclusion:** Results suggest that delayed conduction in RVOT contributes to the increased dispersion of ventricular activation times across leads and the increased 24-h variability in the activation sequence.

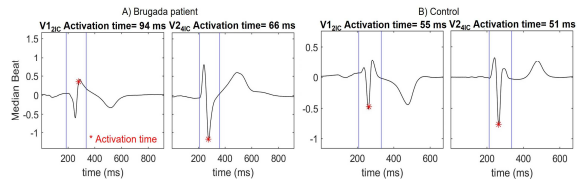


Figure. Median beat for BrS patient and control.

Table. Standard deviation of ventricular activation time (ms) along 24 h.

Population	V1 _{2IC} $p=0.009$	V1 _{3IC} $p=0.002$	V1 _{4IC} $p=0.007$	V2 _{2IC} $p=0.053$	V2 _{3IC} $p=0.161$	V2 _{4IC} $p=0.014$
BrS	6.7[2.6;10.9]	3.8[2.7;12.0]	3.6[2.2;9.1]	8.0[3.6;11.8]	5.8[2.6;11.6]	4.9[2.4;11.0]
Control	2.2[1.6;2.6]	2.2[1.6;2.4]	2.2[1.6;2.2]	2.3[1.8;6.6]	2[1.6;5.0]	2.0[1.3;3.1]